Dec. 10, 1935. N. B. GALKIN 2,023,679

INTERMITTENT DRIVING MECHANISM

Filed Nov. 20, 1934

Fig. 1

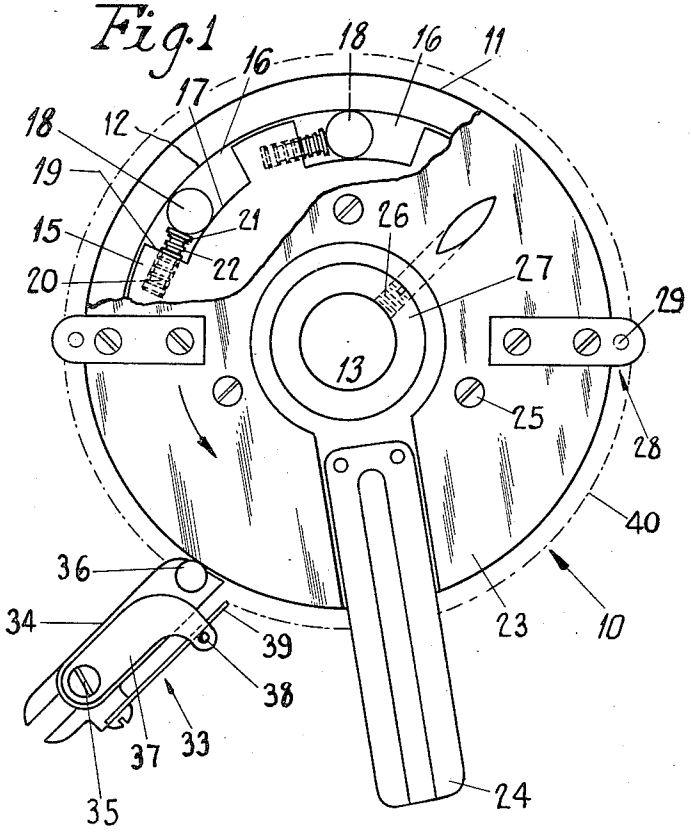


Fig. 2

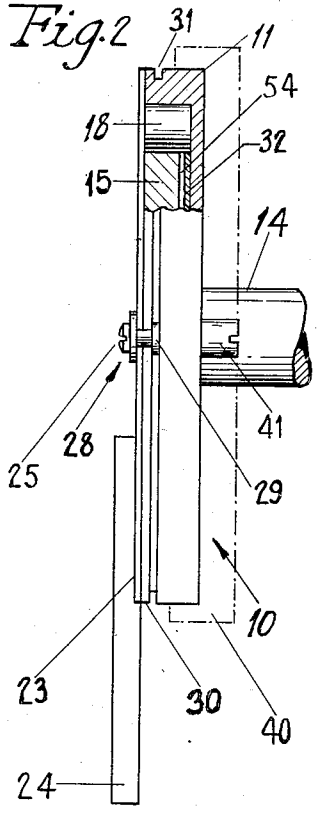


Fig. 5.

Fig. 3

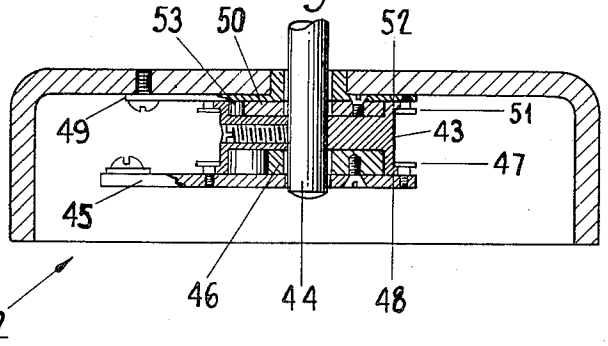
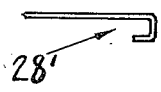


Fig. 4



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INTERMITTENT DRIVING MECHANISM

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Application November 20, 1934, Serial No. 753,835

1 Claim. (Cl. 192—45)

This invention relates to improvements in intermittent driving mechanism for shafts operating at high speed and in small step-by-step movements. This application is a continuation in part of my application Serial No. 705,214, filed January 4, 1934, Patent No. 1,985,406.

In intermittent driving mechanisms it is essential for maximum gripping effect that each roller detent should at all times be maintained in parallel relation to the axis of the mechanism. I have found in actual practice that under high speed operating conditions of three thousand revolutions per minute and in steps of only one thirty-second of an inch, the detent springs do not maintain the detent rollers in parallelism with the axis of the mechanism at all times. This misalignment is especially evident when the intermittent driving mechanism is applied in large diameter and deep casings. It is necessary to apply additional means to augment the detent springs in maintaining the roller detents in parallelism with the axis of the mechanism. The structure herein disclosed effectively maintains the said parallelism by maintaining the cover in constant parallel relation with the end face of the casing.

An object of this invention is to provide an intermittent driving mechanism comprising spring-pressed roller detents interposed between a detent carrier and a casing and to provide means for constantly maintaining the roller detents in parallelism with the axis of the mechanism.

Another object of this invention is to provide an intermittent driving mechanism having a casing and a vibratory cover, the said casing having an annular flange adjacent the vibratory cover and to provide said cover with lateral extensions engageable with said flange and designed to maintain the roller detents in parallelism with the axis of the mechanism.

With the above and other objects in view, the invention will be hereinafter more particularly described, and the combination and arrangement of parts will be shown in the accompanying drawing and pointed out in the claim which forms part of this specification.

Reference will now be had to the drawing, wherein like numerals of reference designate corresponding parts throughout the several views, in which:—

Figure 1 is a plan view of the intermittent driving unit partly broken away to show the roller detents in operative relation.

Figure 2 is a side view of the mechanism, partly in section.

Figure 3 is a central vertical section of an intermittent driving unit comprising clutching and braking mechanism mounted on opposite sides of a casing and having one vibratory cover and one fixed cover and having means incorporated in conjunction with both covers for maintaining the roller detents in parallelism with the axis of the mechanism.

Figure 4 shows a fragmentary portion of a cover having incorporated therein a modified form of angular lateral extension.

Figure 5 is a cross-sectional view of an annular spring having wave portions.

In the illustrated embodiment of the invention shown in Figures 1 and 2, the intermittent driving unit 10 comprises an annular or circularly dished casing 11 having a cylindrical clutching surface 12 and a central aperture 13 for a shaft 14. A detent carrier 15 has been mounted in the casing 11 and is provided with a plurality of peripheral recesses 16 preferably having curved or cam-shaped bottom surfaces 17 positioned in eccentric relation with the clutching surface 12. Roller detents 18 have been placed inside the recesses 16 and contact with the curved surfaces 17. The curved surfaces 17 adjoin radially positioned walls 19 having apertures 20 in which are rivet shaped plungers 21 and coil springs 22. The springs are adapted to engage the heads of the plungers 21 and force them into effective engagement with the rollers 18 and force the rollers toward the narrow end of the recesses 16 and wedge them between the oscillatable detent carrier 15 and the clutching surface 12 of the casing 11. Each peripheral recess 16 contains a detent roller 18 and a spring 22 forcing the roller toward the narrow end of the recess when the parts are assembled in operative relation in the casing 11 as best shown in Figure 1.

A cover plate 23 formed with an integral crank arm 24 has been fastened to the detent carrier 15 by screws 25. The arm 24 may be connected to an oscillatory member of a buttonhole sewing machine where it is necessary to turn the shaft 14 in one direction, and step-by-step, to provide a positive feed high-speed intermittent friction clutch.

When it is attempted to turn the clutching detent carrier 15, the rollers 18 are wedged against the inner circumference or clutching surface of the casing and the carrier 15 and the casing 11 are locked together into unitary relation. A set screw 26 threaded in a hub 27 of the casing 11

grips the shaft 14 which is to be intermittently driven.

The clutch must be adapted to operate with its axis in various inclined positions and with the cover of the casing at the lowest level. When the clutch is in an angular position, the rollers rest with their lower end faces against the upper surface of the cover. As the rollers are maintained in clutching position by light springs, it is possible to displace them from said position by a slight unbalancing force exerted at their lower end faces such as would be caused when the cover assumed an angular position with relation to the plane of the lower end face of the casing. As the cover is constantly oscillated with relation to the casing while depending from the casing, it assumes, after some wear takes place, a position out of the plane of the lower end face of the casing. It is necessary to provide engaging means between the cover and the casing which will maintain both in constant parallel relation while permitting relative motion.

As shown in Figures 1 and 2, the cover plate 23 has angular lateral extensions 28 comprising heads of screws 29 in engagement with an annular flange 30 formed by making a groove 31 in the outer surface of the casing 11. The said lateral extensions connect the cover and casing into unitary relation and maintain the cover in constant perpendicular relation with the axis of the shaft 14.

When the clutch herein described is used to cause intermittent driving of the shaft in a button-hole sewing machine where the axis of the clutch is substantially vertical, the rollers rest upon the upper face of the cover while the clutch operates at very high speed and there is a gradual wearing away of the contacting surfaces. It is essential in order to counteract or eliminate said wear, to harden the wearing surfaces of the clutch elements. Furthermore, in order to compensate for wear at the points where the lateral extensions of the cover engage the casing I have provided a resilient annular spring member 32 positioned between the inner face of the casing and the detent carrier, the said spring serving to press the lateral extensions 28 of the cover into constant frictional engagement with the annular flange 30 on the casing 11 whereby said cover is maintained in constant parallel relation with the casing. The spring 32 may be made of flat thin spring-steel and have a series of lateral undulations or waves 54 pressed therein. The undulations make the annular surface resilient so that it tends to rebound when compressed.

Figure 1 shows mechanism 33 for preventing retrograde movement of the intermittent driving unit 10 and comprises an arm 34 positioned out of line with the center of the shaft 14 and pivoted at 35. The arm 34 supports a rotatable roller 36 in contact with the outer circumference of the casing 11. An arm 37 which is pivoted at 35, may be set in any desired angular position by the pivotal screw 35, carries a pin 38 in contact with a spring 39 and serves for causing pressure against the spring 39, the arm 34 and the roller 36 so as to press the roller against the outer circumference of the casing 11 in a direction opposite to that of the direction of motion of the housing or casing 40, as shown by the arrow thereon. The roller 36 jams against the casing 11 and the moment the driving mechanism 10 stops rotating in the direction of the arrow thereon, the roller prevents the shaft 14 from turning in the wrong direction. In a practical embodiment, the casing 11 is in a housing 40 and is secured to the housing by means of a pin 41 so that the casing 11, the housing 40 and the shaft 14 rotate as a unit.

Figure 3 shows the invention applied to a modified intermittent driving unit 42 comprising an annular casing 43 fixed to a vertical shaft 44. A vibratable arm 45 is secured to a clutching detent carrier 46 and is maintained in parallel relation therewith by heads of screws 47 contacting with a flange 48 at the lower end of the casing. A fixed arm 49 is secured to a braking detent carrier 50 mounted about the shaft 44 and faces in the opposite direction to the vibratable detent carrier 46. The arm 49 and the casing 43 are maintained in parallel relation by heads of screws 51 contacting with a flange 52 at the upper end of the casing. Upon vibrating the arm 45, the casing 43 is partially turned and the shaft 44 is rotated. When the vibratory motion is reversed, the shaft 44 is locked by the jamming of the carrier 50, the rollers 53 and the casing 43 and no retrograde movement or back-lash is possible. The vibratory arm 45 in moving back and forth thus imparts a step-by-step rotary motion to the casing 43 and to the shaft 44 in one direction only.

Figure 4 shows a modified form of angular lateral extension 28′ which may be formed integral with the cover 23 or with the covers 45 and 49 and may be used in place of the screws 29, 47 and 51.

I claim:

In an intermittent driving mechanism comprising a circularly dished casing having a central aperture for a shaft and means for fastening to said shaft, a detent carrier and spring-pressed detent rollers rotatably mounted in said casing, said rollers being forced into contact with the inner circumference of said casing, a cover having lateral angular extensions in engagement with an annular flange on said casing and being fixed to said carrier and providing seating contact for end faces of said rollers for maintaining said rollers in parallelism with the axis of said casing, the rollers and roller contacting members of said mechanism being hardened and resilient means having lateral waves positioned between the inner face of said casing and said detent carrier for automatically compensating for wear and for frictionally holding said cover in perpendicular relation with the axis of said casing.

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